CLAIMS

What is claimed is:

1. A driving apparatus of a multi-function machine, which includes a scanner unit scanning data recorded on a sheet of document, a document transport part to transport the sheet of document, and a printer unit printing the data on a sheet of paper, and a carrier including a print head with an ink jet nozzle mounted thereon to carry out the printing operation by moving the print head, the driving apparatus comprising:

a driving motor;

a scanner driving part driving the scanner unit;

a printer driving part driving the printer unit; and

a power switching part disposed with the driving motor, the scanner driving part, and the printer driving part to selectively transmit a power of the driving motor to at least one of the scanner driving part and the printer driving part.

2. The driving apparatus as claimed in claim 1, wherein the power switching part comprises,

a first clutch disposed with the driving motor, the scanner driving part, and the printer driving part to move between a first power transmitting position transmitting the power of the driving motor to the scanner driving part and a second power transmitting position transmitting the power of the driving motor to the printer driving part, and

a first actuating lever disposed on a moving path of the carrier and actuated by the carrier to move the first clutch between the first power transmitting position and the second power transmitting position.

3. The driving apparatus as claimed in claim 2, further comprising:

a frame, wherein the first clutch comprises,

a first rotation axis disposed at the frame,

a first paper-feed clutch gear disposed at the first rotation axis to engage with the printer driving part, and having first paper-feed clutch teeth formed on a face thereof,

a first scanner clutch gear disposed at the first rotation axis to engage with the scanner driving part, and having first scanner clutch teeth formed on a face thereof which is located toward the first paper-feed clutch teeth,

a first middle clutch gear disposed at the first rotation axis between the first paper-feed clutch gear and the first scanner clutch gear to engage with the driving motor, and having first homologous paper-feed clutch teeth formed on one face thereof and opposite to the first paper-feed clutch teeth, and engaging to the first paper-feed clutch teeth, and first homologous scanner clutch teeth formed on the other face thereof and opposite to the first scanner clutch teeth, and engaging to the first scanner clutch teeth, and

a first clutch spring disposed between the first middle clutch gear and the first scanner clutch gear to elastically urge the first middle clutch gear toward the first paper-feed clutch gear to allow the first homologous paper-feed clutch teeth of the first middle clutch gear to engage with the first paper-feed clutch teeth of the first paper-feed clutch gear.

4. The driving apparatus as claimed in claim 3, wherein the first paper-feed clutch teeth, the first scanner clutch teeth, the first homologous paper-feed clutch teeth, and the first homologous scanner clutch teeth are respectively formed of a plurality of teeth, each having a cross section such as a triangle, a rectangle, or a trapezoid to switch the power to be transmitted, where the plurality of teeth are formed at the corresponding faces of the gears.

5. The driving apparatus as claimed in claim 3, wherein the first actuating lever comprises,

a first one end disposed between the first middle clutch gear and the first paper-feed clutch gear to move between a first paper-feed driving position and a first scanner driving position, the first paper-feed driving position comprising a position which the first one end allows the first homologous paper-feed clutch teeth to engage with the first paper-feed clutch teeth, and the first scanner driving position comprising a position which the first one end moves the first middle clutch gear toward the first scanner clutch gear against a force of the first clutch spring to allow the first homologous paper-feed clutch teeth to disengage from the first paper-feed clutch teeth and to allow the first homologous scanner clutch teeth to engage with the first scanner clutch teeth,

a first other end disposed on the moving path of the carrier and actuated by the carrier when the carrier is moved, to move the first one end to the first scanner driving position, and

a first middle portion having a first support axis supported at the frame to allow the first one end to be moved between the first paper-feed driving position and the first scanner driving position by the first other end.

6. The driving apparatus as claimed in claim 2, wherein the power switching part comprises,

a second clutch disposed with the driving motor, the scanner driving part, and the printer driving part to move between a third power transmitting position transmitting the power of the driving motor to the printer driving part and a fourth power transmitting position transmitting the power of the driving motor to both the printer driving part and the scanner driving part, and

a second actuating lever disposed on a moving path of the carrier and actuated by the carrier, to move the second clutch between the third power transmitting position and the fourth power transmitting position.

7. The driving apparatus as claimed in claim 6, wherein the driving motor comprises a driving motor gear comprising first and second gears coaxially disposed in a spaced-apart relation with each other.

8. The driving apparatus as claimed in claim 7, further comprising:

a frame, wherein the second clutch comprises,

a second rotation axis disposed at the frame,

a second paper-feed clutch gear disposed at the second rotation axis to engage with the printer driving part and a first gear of the driving motor,

a second scanner clutch gear disposed at the second rotation axis to engage with the scanner driving part, wherein the second scanner clutch gear comprises second scanner clutch teeth formed on a face thereof and located toward the second paper-feed clutch gear,

a second middle clutch gear disposed at the second rotation axis between the second paper-feed clutch gear and the second scanner clutch gear to engage with or disengage from the second gear of the driving motor, wherein the second middle clutch gear comprises second homologous scanner clutch teeth formed on one face thereof and opposite to the second scanner clutch teeth to engage with the second scanner clutch teeth, and

a second clutch spring disposed between the second middle clutch gear and the second scanner clutch gear to elastically urge the second middle clutch gear toward the second paper-feed clutch gear, allowing the second middle clutch gear to disengage from the second gear of the driving motor and, at the same time, allowing the second homologous scanner clutch teeth of the second middle clutch gear to disengage from the second scanner clutch teeth of the second scanner clutch gear.

9. The driving apparatus as claimed in claim 8, wherein the second scanner clutch teeth and the second homologous scanner clutch teeth are respectively formed of a plurality of teeth, each having a cross section such as a triangle, a rectangle, and a trapezoid to switch the power to be transmitted, and are formed at the corresponding faces of the gears.

10. The driving apparatus as claimed in claim 8, wherein the second actuating lever comprises,

a second one end disposed between the second middle clutch gear and the second paper-feed clutch gear to move between a second paper-feed driving position and a first paper-feed/scanner driving position,

the second paper-feed driving position comprising a position which the second one end allows the second middle clutch gear to disengage from the second gear of the driving motor and, at the same time, allows the second homologous scanner clutch teeth to disengage from the second scanner clutch teeth, and

the first paper-feed/scanner driving position comprising a position which the second one end moves the second middle clutch gear toward the second scanner clutch gear against a force of the second clutch spring to allow the second middle clutch gear to engage with the second gear of the driving motor and, at the same time, to allow the second homologous scanner clutch teeth to engage with the second scanner clutch teeth,

a second other end disposed on the moving path of the carrier and actuated by the carrier when the carrier is moved, to move the second one end to the first paper-feed/scanner driving position, and

a second middle portion having a second support axis supported at the frame to allow the second one end to be movable between the second paper-feed driving position and the first paper-feed/scanner driving position by the second other end.

11. The driving apparatus as claimed in claim 6, wherein the driving motor comprises a driving motor gear comprising an elongated gear extendable in an axial direction.

12. The driving apparatus as claimed in claim 11, further comprising:

a frame, wherein the second clutch comprises,

a third rotation axis disposed at the frame,

a third paper-feed clutch gear disposed at the third rotation axis to engage with the printer driving part and one end of the driving motor gear,

a third scanner clutch gear disposed at the third rotation axis to engage with the scanner driving part, wherein the third scanner clutch gear comprises third scanner clutch teeth formed on a face thereof and located toward the third paper-feed clutch gear,

a third middle clutch gear disposed at the third rotation axis between the third paper-feed clutch gear and the third scanner clutch gear to engage with the other end of the driving motor gear of the driving motor, wherein the third middle clutch gear comprises third homologous scanner clutch teeth formed on one face thereof and opposite to the third scanner clutch teeth to engage with the third scanner clutch teeth, and

a third clutch spring disposed between the third middle clutch gear and the third scanner clutch gear to elastically urge the third middle clutch gear toward the third paper-feed clutch gear to allow the third homologous scanner clutch teeth of the third middle clutch gear to disengage from the third scanner clutch teeth of the third scanner clutch gear.

13. The driving apparatus as claimed in claim 12, wherein the third scanner clutch teeth and the third homologous scanner clutch teeth are respectively formed of a plurality of teeth, each having a cross section such as a triangle, a rectangle, or a trapezoid to switch the power to be transmitted, where the plurality of teethare formed at the corresponding faces of the gears.

14. The driving apparatus as claimed in claim 12, wherein the second actuating lever comprises,

a third one end disposed between the third middle clutch gear and the third paper-feed clutch gear to move between a third paper-feed driving position and a second paper-feed/scanner driving position, wherein the third paper-feed driving position comprises a position which the third one end allows the third homologous scanner clutch teeth to disengage from the third scanner clutch teeth, and the second paper-feed/scanner driving position comprises a position which the third one end moves the third middle clutch gear toward the third scanner clutch gear against a force of the third clutch spring to allow the third homologous scanner clutch teeth to engage with the third scanner clutch teeth,

a third other end disposed on the moving path of the carrier and actuated by the carrier when the carrier is moved, to move the third one end to the second paper-feed/scanner driving position, and

a third middle portion having a third support axis supported at the frame to allow the third one end to be movable between the third paper-feed driving position and the second paper-feed/scanner driving position by the third other end.

15. The driving apparatus as claimed in claim 6, further comprising:

a frame, wherein the second clutch comprises,

a fourth rotation axis disposed at the frame,

a fourth paper-feed clutch gear disposed at the fourth rotation axis to engage with the printer driving part and the driving motor, and having at least a fourth paper-feed clutch tooth formed on one face thereof,

a fourth scanner clutch gear disposed at the fourth rotation axis to engage with the scanner driving part, wherein the fourth scanner clutch gear comprises fourth scanner clutch teeth formed on a face thereof and located toward the fourth paper-feed clutch tooth,

a fourth middle clutch gear disposed at the fourth rotation axis between the fourth paper-feed clutch gear and the fourth scanner clutch gear, wherein the fourth middle clutch gear comprises at least a fourth homologous paper-feed clutch tooth formed on an inner circumference surface thereof, opposite to the fourth paper-feed clutch tooth, to engage with the fourth paper-feed clutch tooth, and comprises fourth homologous scanner clutch teeth formed on a face thereof, opposite to the fourth scanner clutch teeth, to engage with the fourth scanner clutch teeth, and

a fourth clutch spring disposed between the fourth middle clutch gear and the fourth scanner clutch gear to elastically urge the fourth middle clutch gear toward the fourth paper-feed clutch gear to allow the fourth middle clutch gear to separate from the fourth scanner clutch gear.

16. The driving apparatus as claimed in claim 15, wherein the fourth paper-feed clutch tooth and the fourth homologous paper-feed clutch tooth are respectively formed of a first sliding boss projected in an axial direction from the one face of the fourth paper-feed clutch gear and a first sliding boss-engaging portion, formed in the inner circumference surface of the fourth middle clutch gear to receive the first sliding boss to be slidable in the axial direction, so that the fourth paper-feed clutch tooth is engaged with the fourth homologous paper-feed clutch tooth to transmit the power of the driving motor, where the first sliding boss comprises a first sliding key or a first sliding tooth formed to be extended in the axial direction on an outer circumference surface thereof, and the first sliding boss-engaging portion comprises a first receiving groove formed in a shape corresponding to the first sliding key or the first sliding tooth at the inner circumference surface of the fourth middle clutch gear.

17. The driving apparatus as claimed in claim 16, wherein the fourth scanner clutch teeth and the fourth homologous scanner clutch teeth are respectively formed of a plurality of teeth, each having a cross section such as a triangle, a rectangle, or a trapezoid to switch the power to be transmitted, where the plurality of teeth are formed at the corresponding faces of the gears.

18. The driving apparatus as claimed in claim 15, wherein the second actuating lever comprises,

a fourth one end disposed between the fourth middle clutch gear and the fourth paper-feed clutch gear to move between a fourth paper-feed driving position and a third paper-feed/scanner driving position, the fourth paper-feed driving position comprising a position which the fourth one end allows the fourth homologous scanner clutch teeth to disengage from the fourth scanner clutch teeth, and the third paper-feed/scanner driving position comprising a position which the fourth one end moves the fourth middle clutch gear toward the fourth scanner clutch gear against a force of the fourth clutch spring to allow the fourth homologous scanner clutch teeth to engage with the fourth scanner clutch teeth,

a fourth other end disposed on the moving path of the carrier and actuated by the carrier when the carrier is moved, to move the fourth one end to the third paper-feed/scanner driving position, and

a fourth middle portion having a fourth support axis supported at the frame to allow the fourth one end to be moved between the fourth paper-feed driving position and the third paper-feed/scanner driving position by the fourth other end.

19. The driving apparatus as claimed in claim 6, further comprising:

a frame, wherein the second clutch comprises,

a fifth rotation axis disposed at the frame,

a fifth paper-feed clutch gear disposed at the fifth rotation axis to engage with the printer driving part and the driving motor, wherein the fifth paper-feed clutch gear comprises a fifth paper-feed clutch tooth formed on one face thereof,

a fifth scanner clutch gear disposed at the fifth rotation axis to be movable between a paper-feeding position and a paper-feeding/scanning position, wherein the fifth scanner clutch gear comprises a fifth scanner clutch tooth formed at an inner circumference surface thereof to engage the fifth paper-feed clutch tooth, and wherein the paper-feeding/scanning position comprises a position which the fifth scanner clutch gear is engaged with the scanner driving part and the paper-feeding position comprises a position which fifth scanner clutch gear is disengaged from the scanner driving part, and

a fifth clutch spring disposed between the fifth scanner clutch gear and a top of the fifth rotation axis to elastically urge the fifth scanner clutch gear toward the fifth paper-feed clutch gear and to maintain the fifth scanner clutch gear at the paper-feeding position.

20. The driving apparatus as claimed in claim 19, wherein the fifth paper-feed clutch tooth and the fifth scanner clutch tooth are respectively formed of a second sliding boss, projected in an axial direction from the one face of the fifth paper-feed clutch gear, and a second sliding boss-engaging portion, formed at the inner circumference surface of the fifth scanner clutch gear to receive the second sliding boss, which is slidable in the axial direction, so that the fifth paper-feed clutch tooth is engaged with the fifth scanner clutch tooth to transmit the power of the driving motor, where the second sliding boss comprises a second sliding key or a second sliding tooth extendable in the axial direction on an outer circumference surface thereof, and the second sliding boss-engaging portion comprises a second receiving groove formed in a shape corresponding to the second sliding key or the second sliding tooth at the inner circumference surface of the fifth scanner clutch gear.

21. The driving apparatus as claimed in claim 19, wherein the second actuating lever comprises,

a fifth one end disposed between the fifth scanner clutch gear and the fifth paper-feed clutch gear to move between a fifth paper-feed driving position and a fourth paper-feed/scanner driving position, the fifth paper-feed driving position comprising a position which the fifth one end allows the fifth scanner clutch gear to be maintained at the paper-feeding position, and the fourth paper-feed/scanner driving position comprising a position which the fifth one end moves the fifth scanner clutch gear toward the scanner driving part against a force of the fifth clutch spring to allow the fifth scanner clutch gear to be maintained at the paper-feeding/scanning position,

a fifth other end disposed on the moving path of the carrier and actuated by the carrier when the carrier is moved, to move the fifth one end to the fourth paper-feed/scanner driving position, and

a fifth middle portion having a fifth support axis supported at the frame to allow the fifth one end to be moved between the fifth paper-feed driving position and the fourth paper-feed/scanner driving position by the fifth other end.

22. The driving apparatus as claimed in claim 1, further comprising:

a swing gear train disposed between the power switching part and the scanner driving part to facilitate a gear assembling therebetween.

23. The driving apparatus as claimed in claim 22, further comprising:

a first frame; and

a second frame, wherein the swing gear train comprises,

a swing gear disposed at the first frame to engage with the power switching part mounted on the first frame,

a swing lever formed of a V-shaped form and disposed coaxially with the swing gear to rotate on a center of the swing gear, and

a pair of idle gears respectively disposed at both ends of the swing lever to be selectively connected with the scanner driving part mounted on the second frame during the rotation of the swing lever.

24. A power transmitting apparatus connecting a first gear train mounted on a first frame with a second gear train mounted on a second frame adjacent to the first frame comprising:

a swing gear disposed at a first frame to engage with the first gear train,

a swing lever formed of a V-shaped form and disposed coaxially with the swing gear to rotate on a center of the swing gear, and

a pair of idle gears respectively disposed at both ends of the swing lever to be selectively connected with the second gear train during the rotation of the swing lever.

25. The power transmitting apparatus as claimed in claim 24, wherein the swing lever comprises,

a body comprising a V-shaped form and comprising an axis hole formed at a center thereof to receive a support axis of the swing gear; and

engaging projections formed at both ends of the body to rotatably support the idle gears.

26. The power transmitting apparatus as claimed in claim 25, wherein each of the engaging projections comprises,

a cutting portion formed to be cut in a given width at a center of the engaging projection; and

an anti-escaping jaw disposed at an upper portion of the engaging projection and having a top end rounded off in a direction that a corresponding one of the idle gears is inserted end and an angled bottom end.

27. The power transmitting apparatus as claimed in claim 24, further comprising:

elastic members disposed between the idle gears and the swing lever to contact the idle gears closely to the swing lever.

28. The power transmitting apparatus as claimed in claim 27, wherein each of the elastic members is formed of a leaf spring supported around each corresponding engaging projection to be coaxially coupled with one of the corresponding idle gears.

29. A power switching apparatus selectively transmitting a power generated from a driving source into various directions, comprising:

a main clutch gear movably disposed at a rotation axis and coupled to the driving source to be rotated on the rotation axis;

first and second clutch gears rotatably disposed at the rotation axis to selectively receive the power from the main clutch gear;

a clutch spring urging the main clutch gear to engage with the first clutch gear; and

a compulsory power switching unit forcibly disengaging the main clutch gear from the first clutch gear and engaging the main clutch gear with the second clutch gear.

30. The power switching apparatus as claimed in claim 29, wherein the compulsory power switching unit cornprises:

an actuating lever rotatably disposed at a frame on which the rotation axis is supported, and having one end interposed between the main clutch gear and the first clutch gear; and

a pressing member compulsory rotating the actuating lever to allow the one end of the actuating lever to push the main clutch gear toward the second clutch gear, thereby separating the main clutch gear from the first clutch gear.

31. The power switching apparatus as claimed in claim 30, wherein the actuating lever comprises:

a lever body rotatably supported at the frame, and

a power switching end bended at and extended from one end of the lever body to be interposed between the first clutch gear and the main clutch gear and having a hole receiving the rotation axis.

32. The power switching apparatus as claimed in claim 31,

wherein the main clutch gear comprises clutch teeth formed at both faces thereof, and

wherein each of the first and second clutch gears comprises homologous clutch teeth formed to correspond to the clutch teeth of the main clutch gear.

33. The power switching apparatus power as claimed in claim 32, wherein one of the clutch teeth of the main clutch gear is engaged with the homologous clutch teeth of the first clutch gear, through the hole of the power switching end, and formed at the one end of the lever body.

34. The power switching apparatus as claimed in claim 33, wherein the power switching end comprises a thickness smaller than a sum total in thickness to the one of the clutch teeth of the main clutch gear and the homologous clutch teeth of the first clutch gear.